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(54) **INSULATED PANEL AND METHOD OF ASSEMBLY**

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F25D 23/08	(2006.01)
E04B 2/60	(2006.01)
A47F 3/04	(2006.01)
F16B 5/06	(2006.01)
F16B 5/12	(2006.01)
F16B 11/00	(2006.01)

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CPC ... ***F16B 5/00*** (2013.01); ***E04B 2/56*** (2013.01); ***F25D 23/085*** (2013.01); *E04B 2/60* (2013.01); *A47F 3/0482* (2013.01); *F16B 5/0635* (2013.01); *F16B 5/128* (2013.01); *F16B 11/006* (2013.01)
USPC **52/282.3**

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See application file for complete search history.

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(57) **ABSTRACT**

An insulated panel including first and second walls (**5.004**, **5.024**) spaced apart by a predetermined distance, each wall including an internal peripheral channel formed by first and second bends, the second bend forming an internal peripheral flange (**5.025**, **5.056**), the panel including an intermediate joining member (**5.042**) adapted to connect to the internal peripheral flanges of the first and second walls. The connection to a first flange can be via a slot (**6.046**), and the connection to the second flange can be by adhesive (**5.044**).

12 Claims, 9 Drawing Sheets

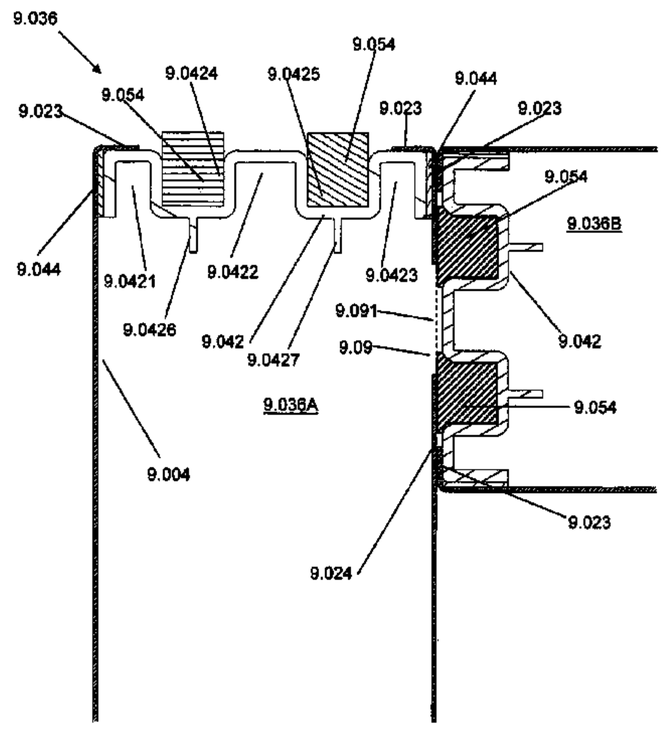

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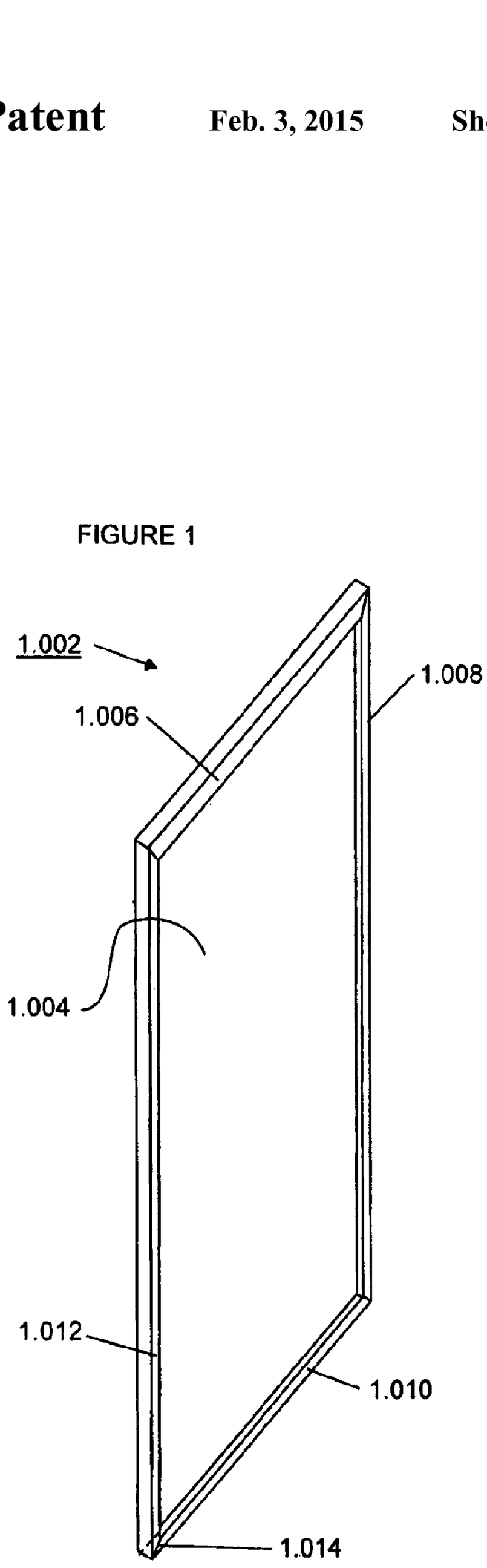
FIGURE 1



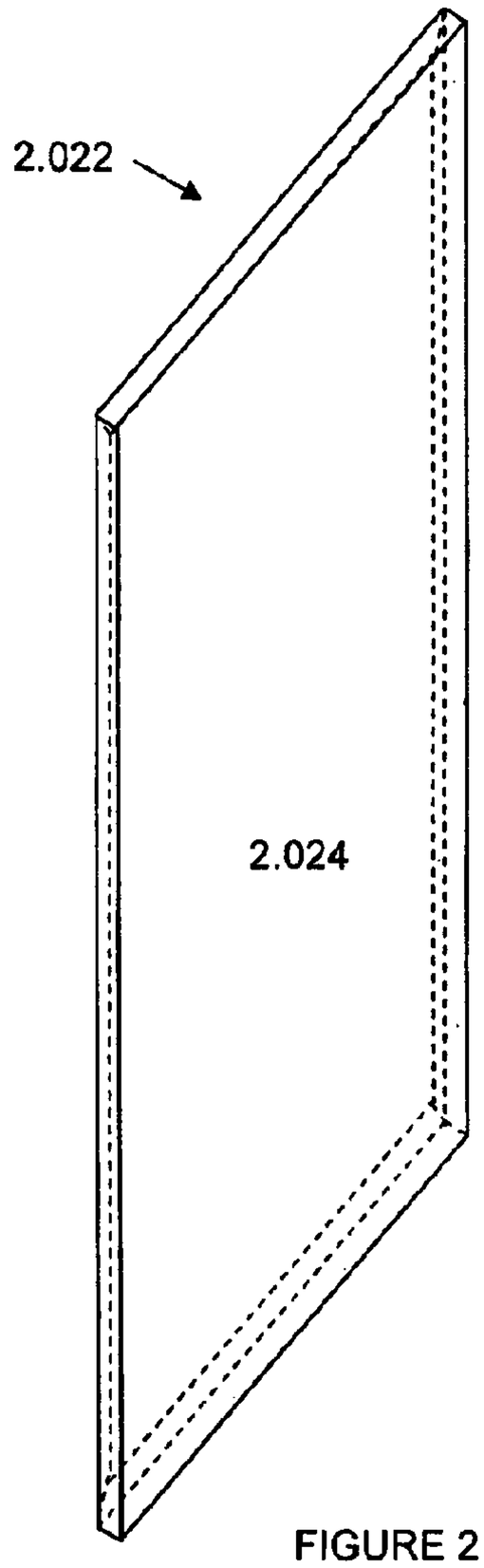


FIGURE 2

FIGURE 3

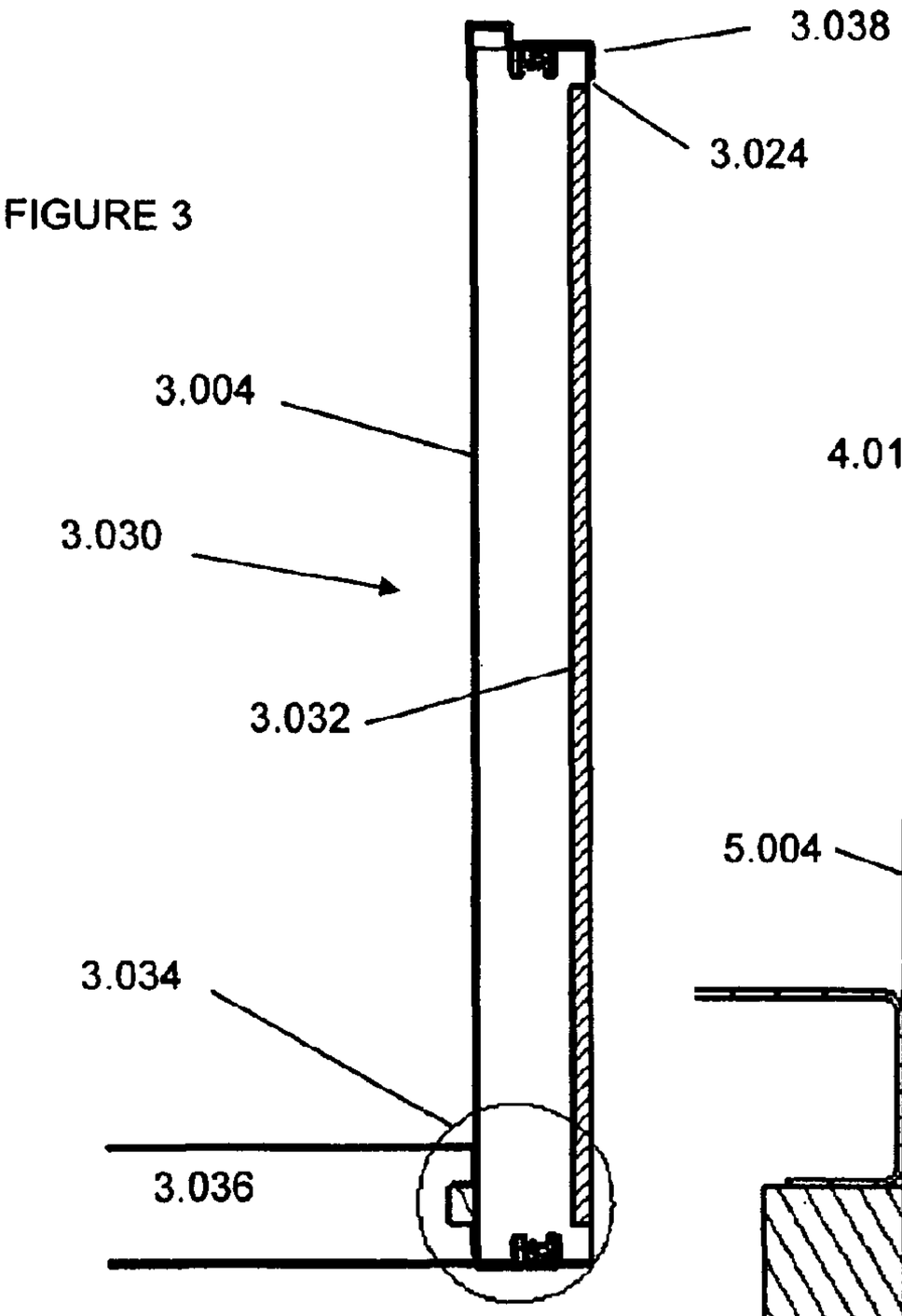


FIGURE 4

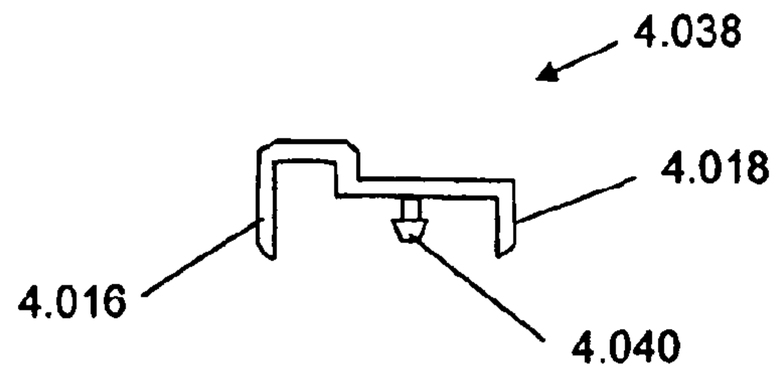
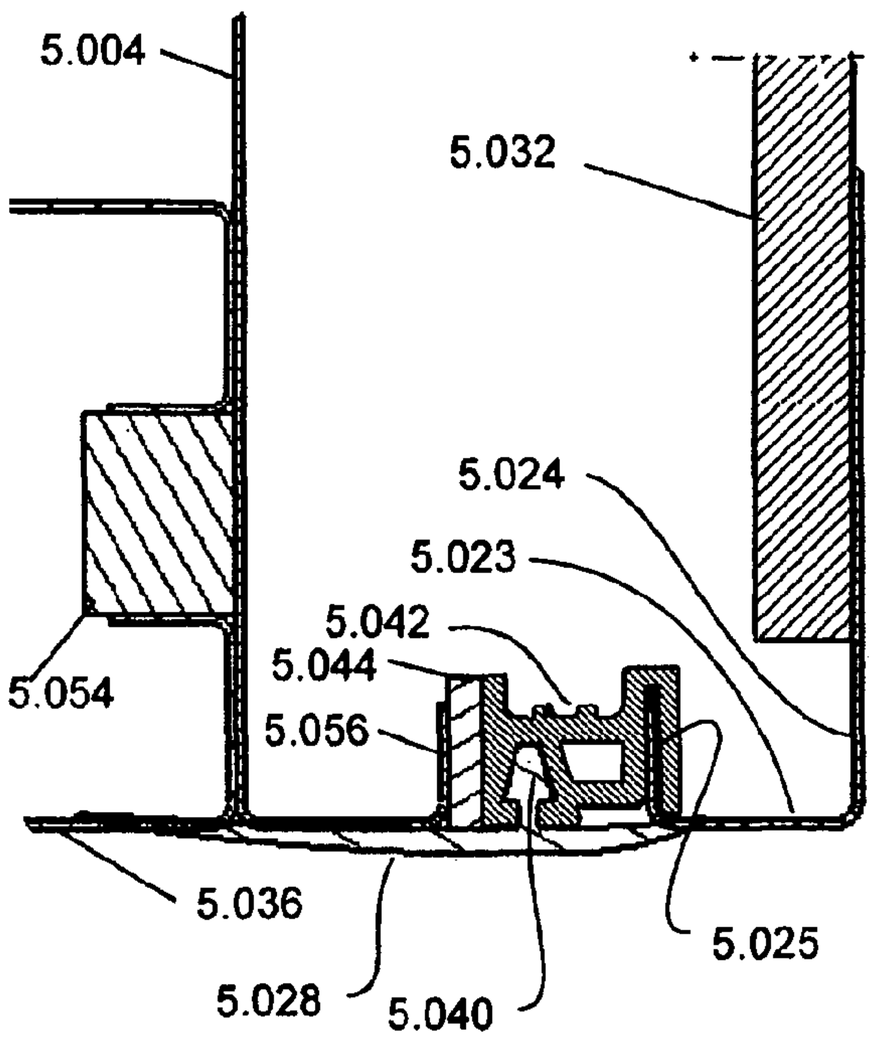


FIGURE 5



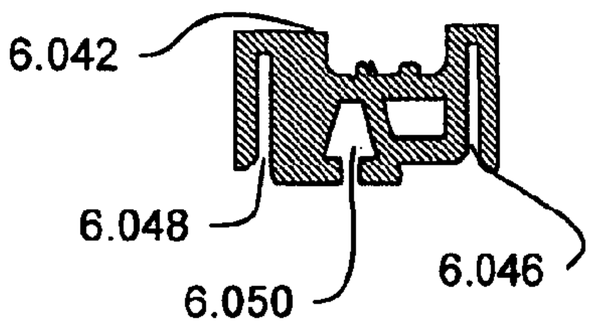


FIGURE 6

FIGURE 7

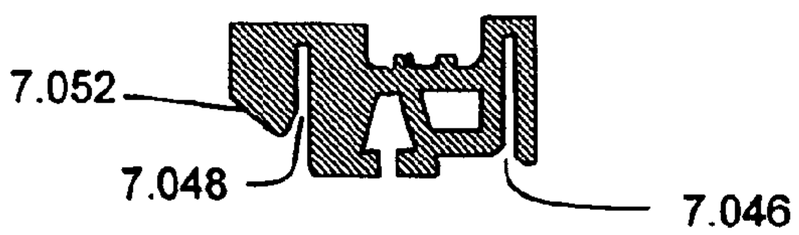
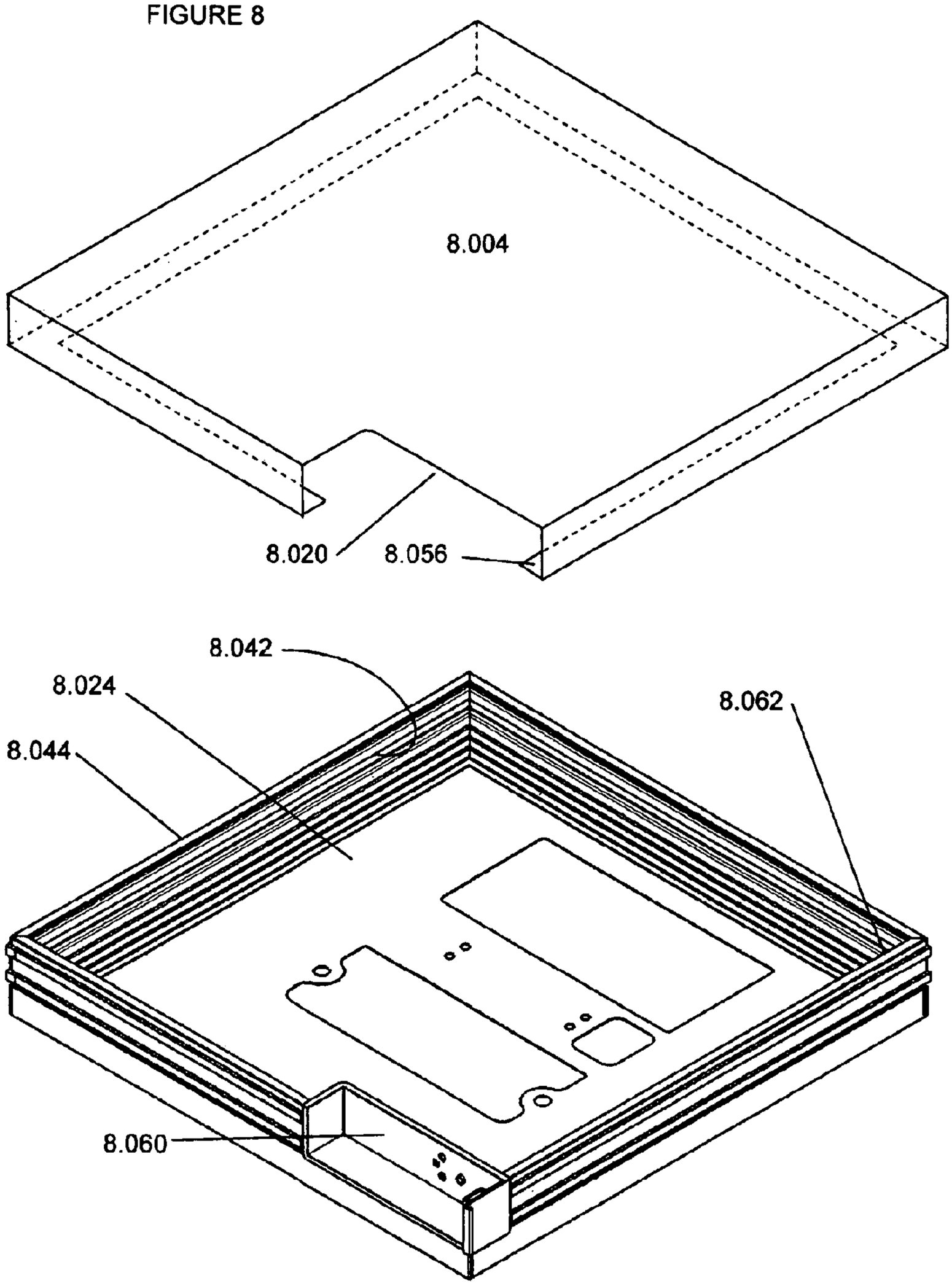
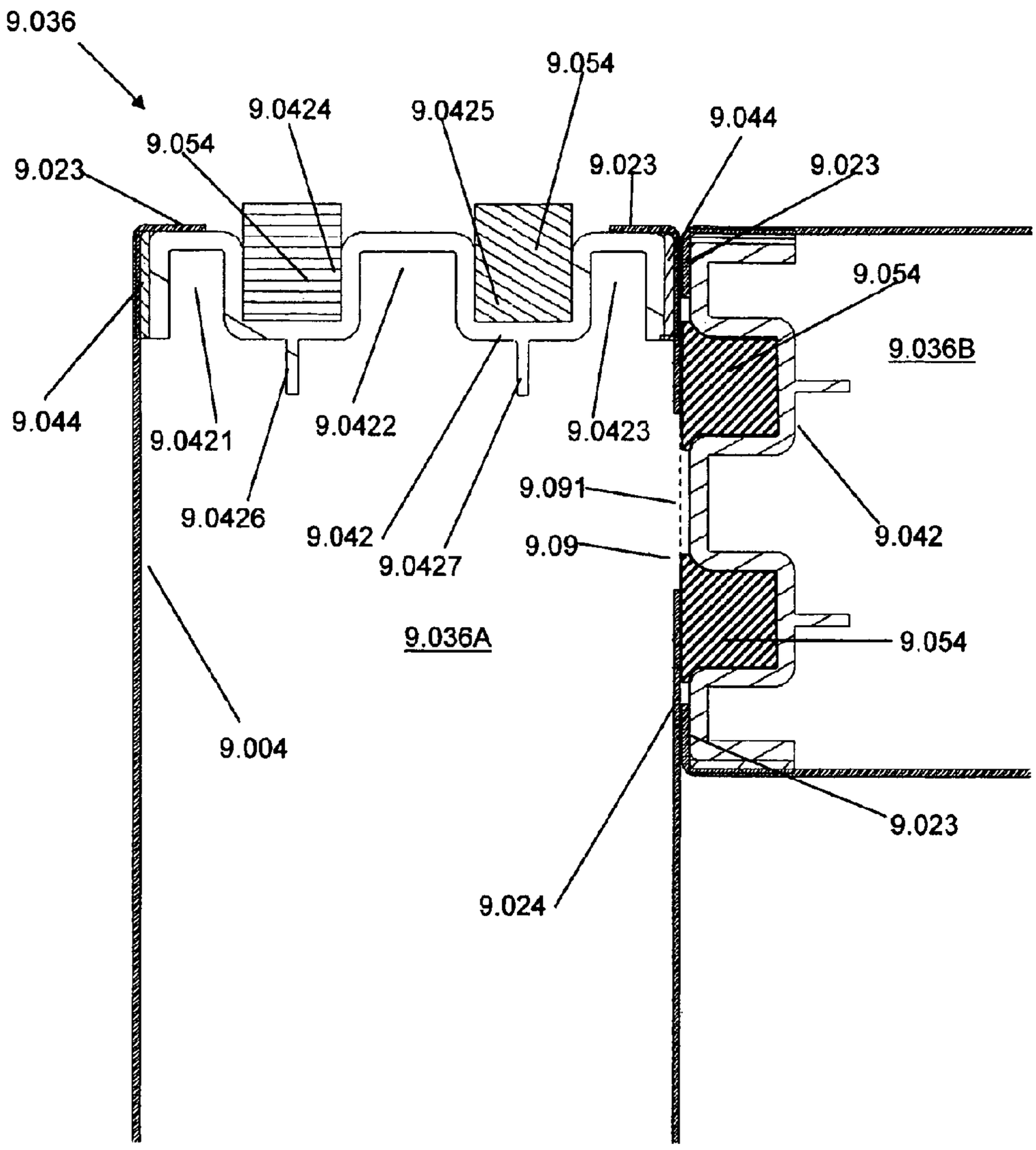


FIGURE 8

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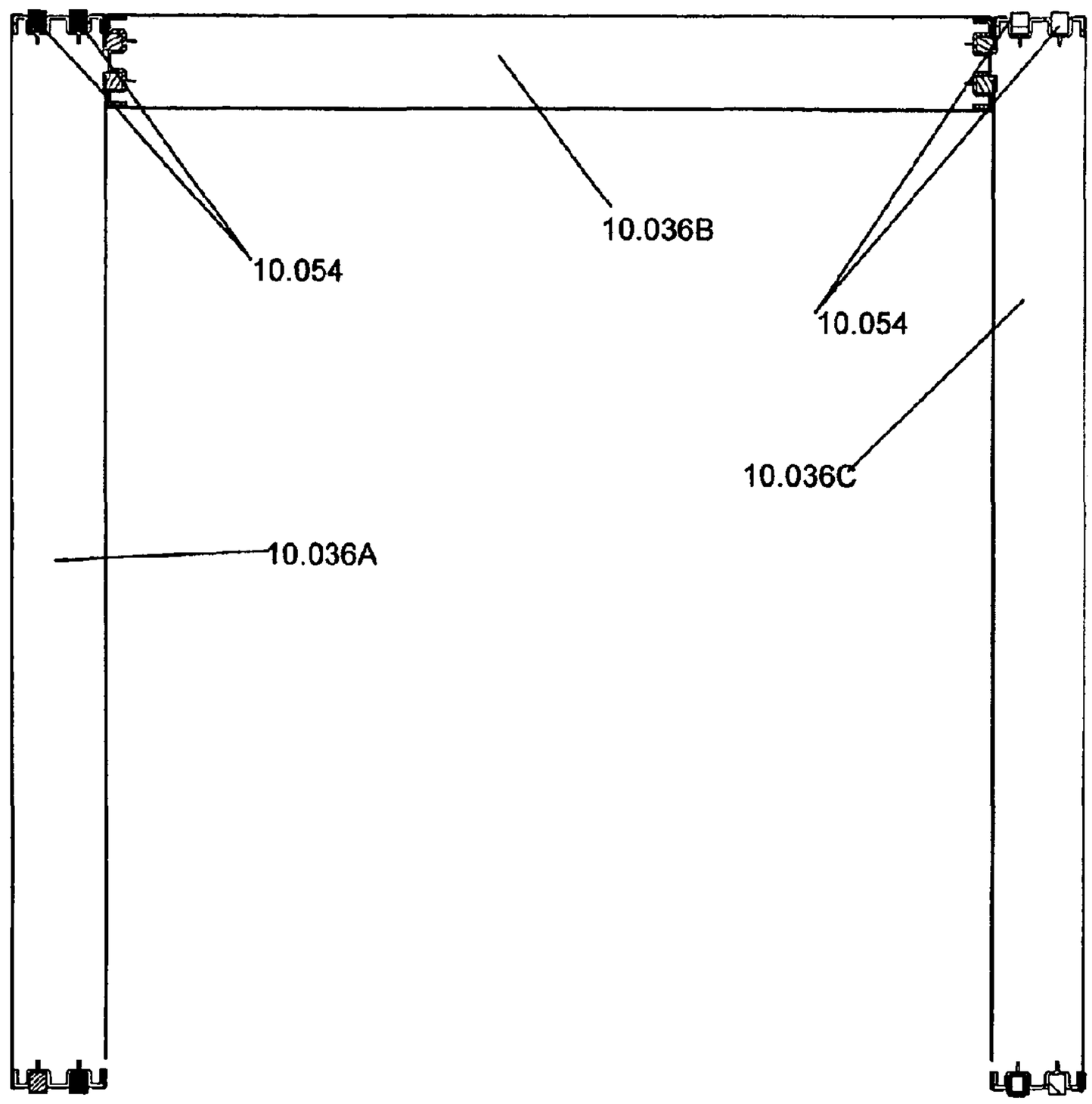
9.024

FIGURE 9



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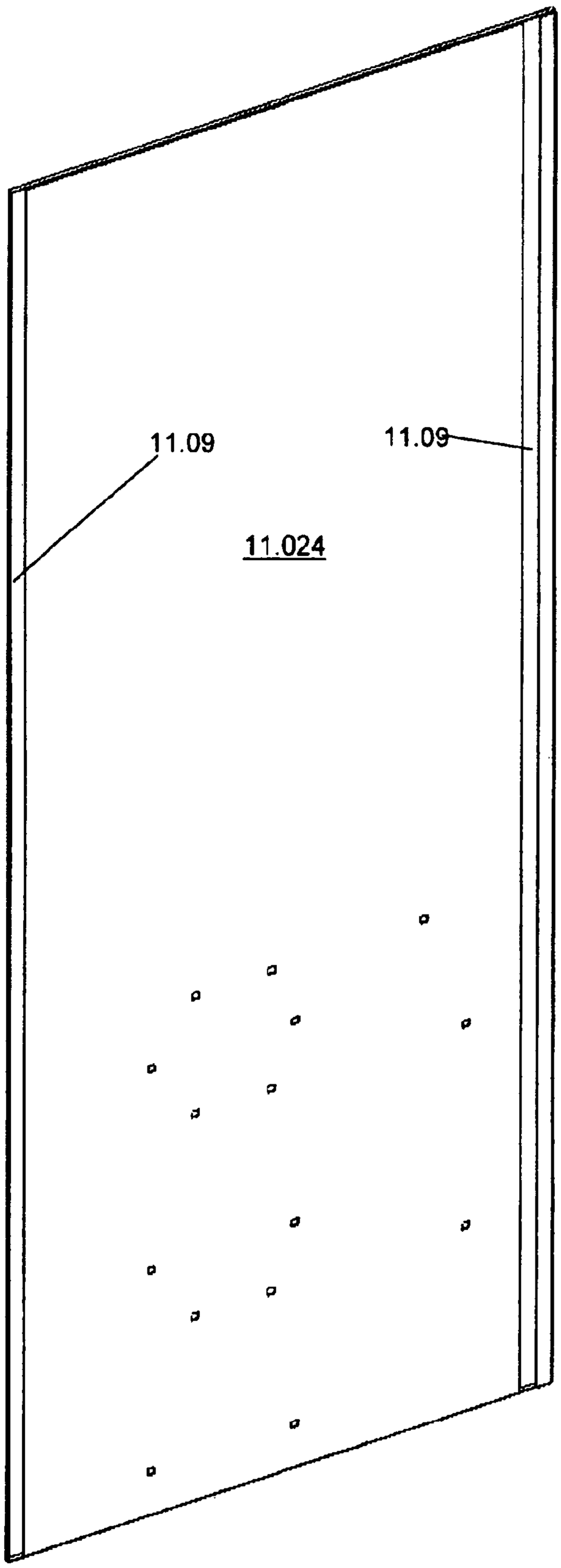
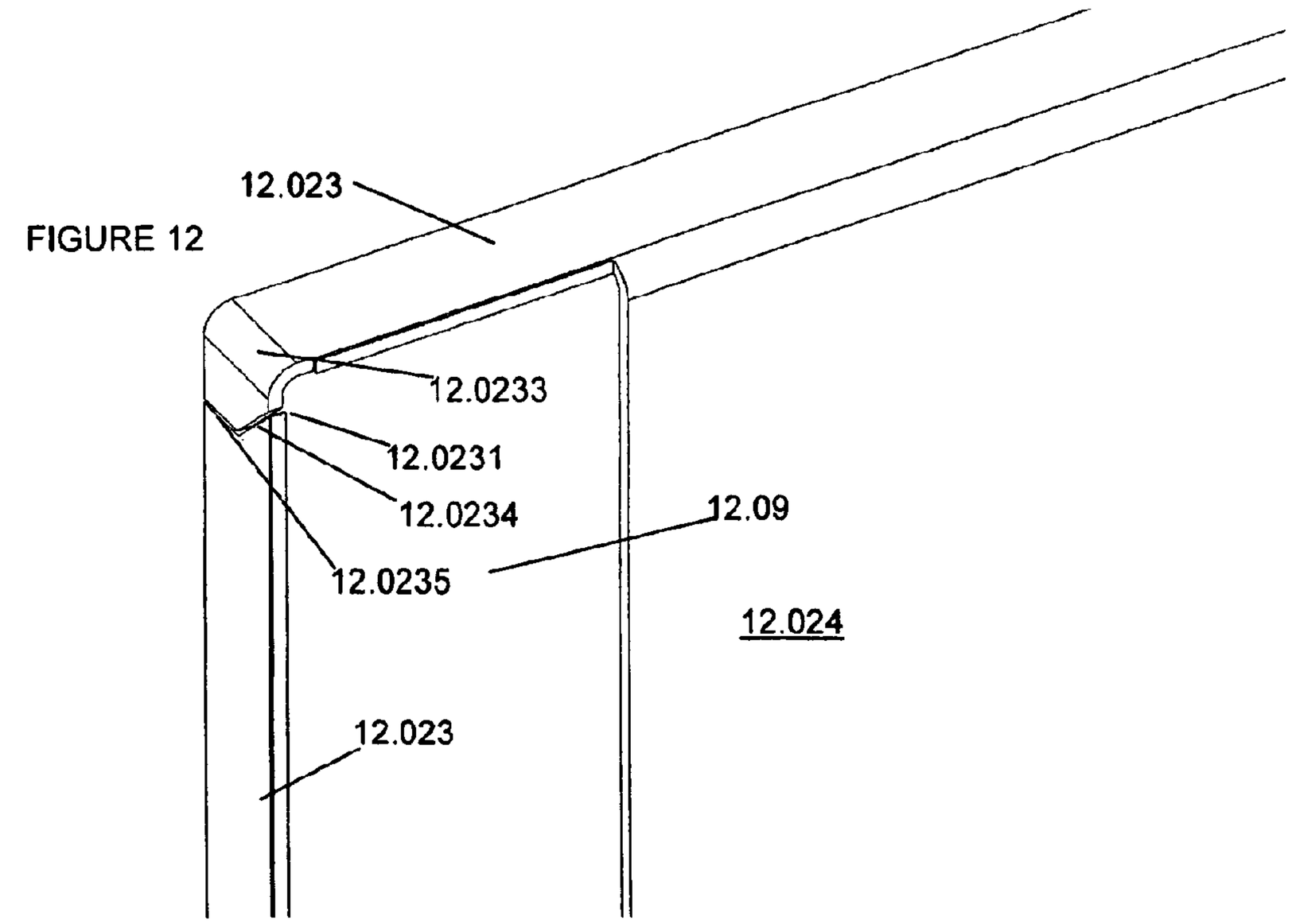


FIGURE 11

FIGURE 12



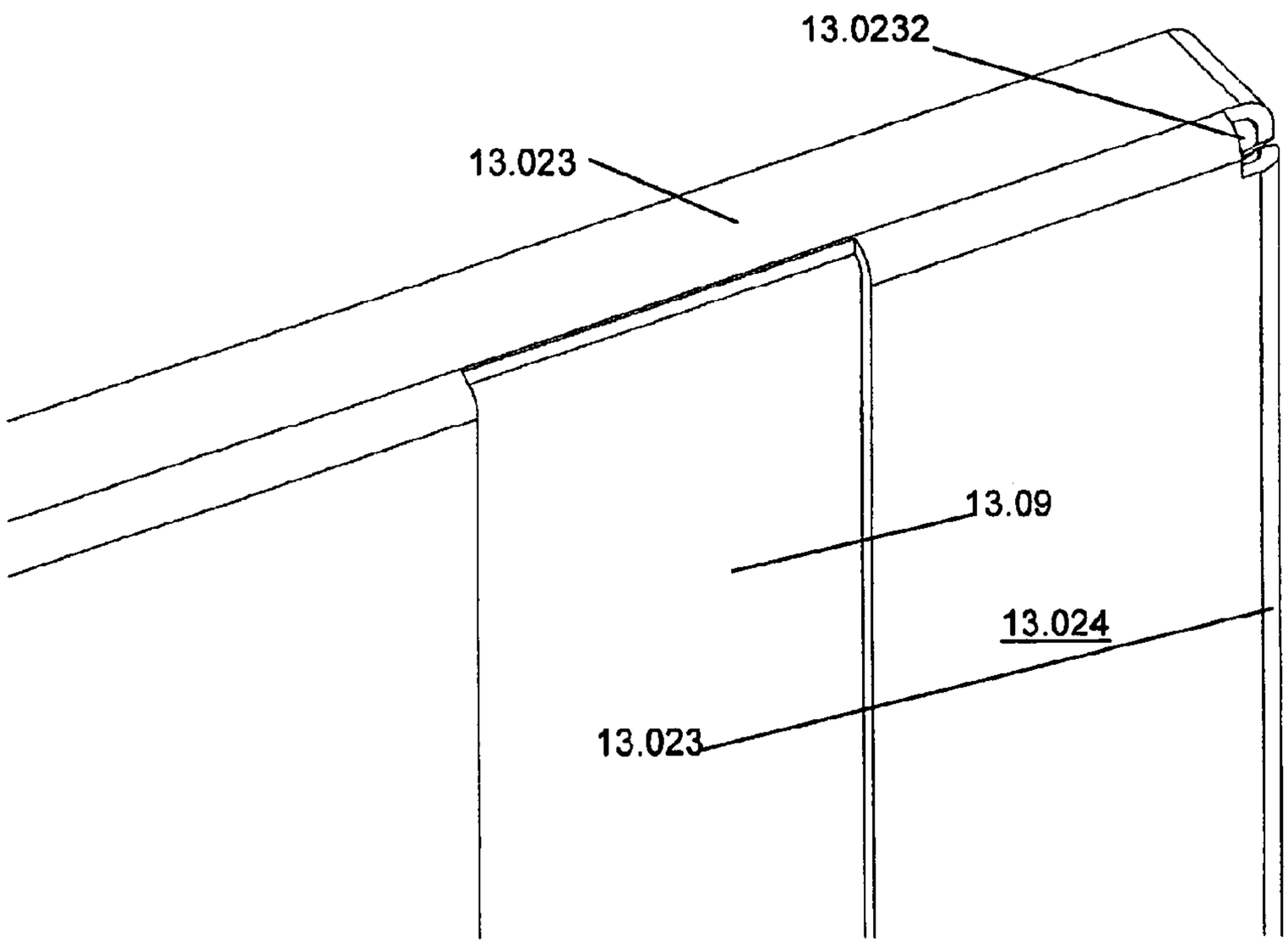


FIGURE 13

FIGURE 14

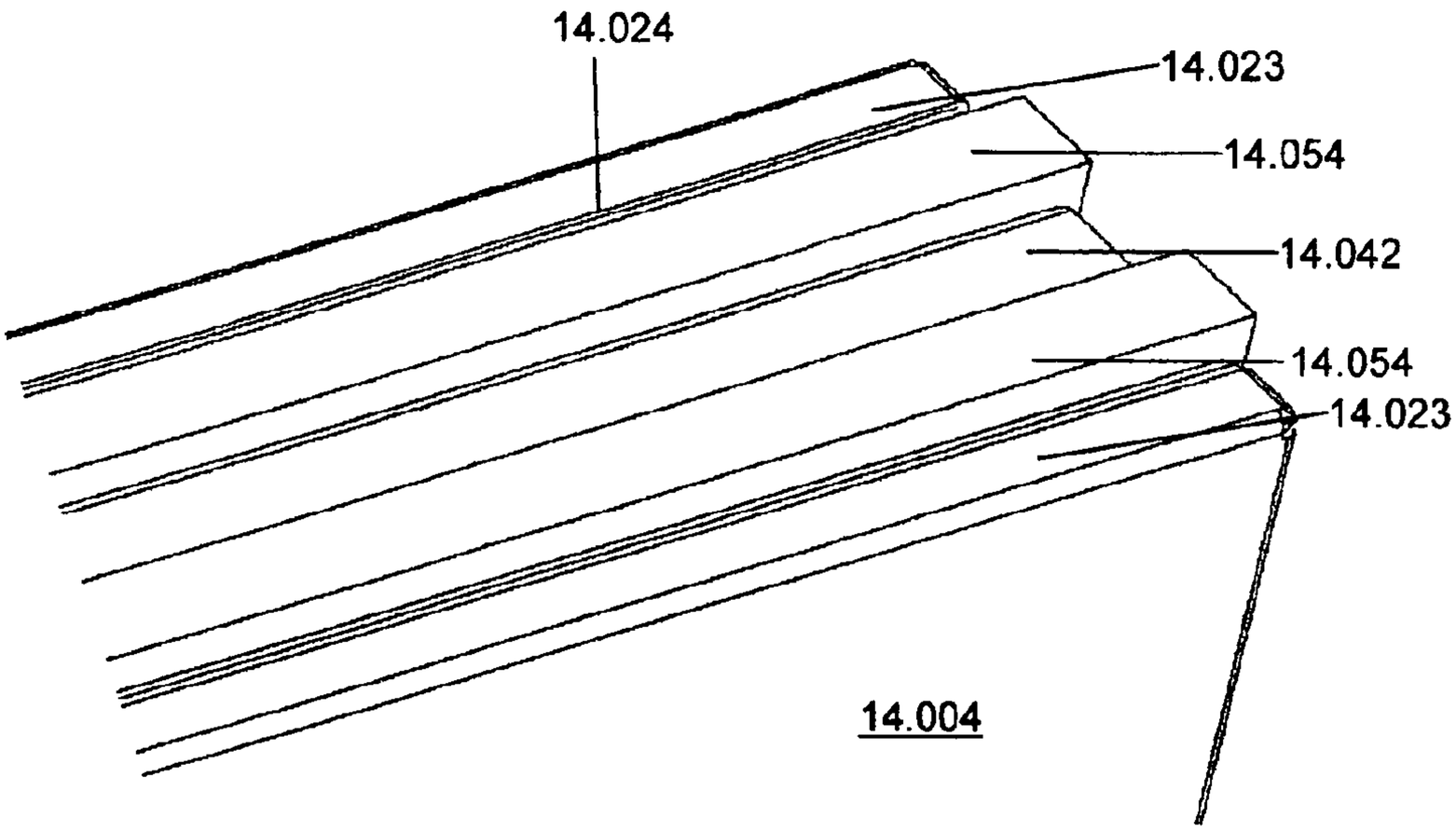


FIGURE 16

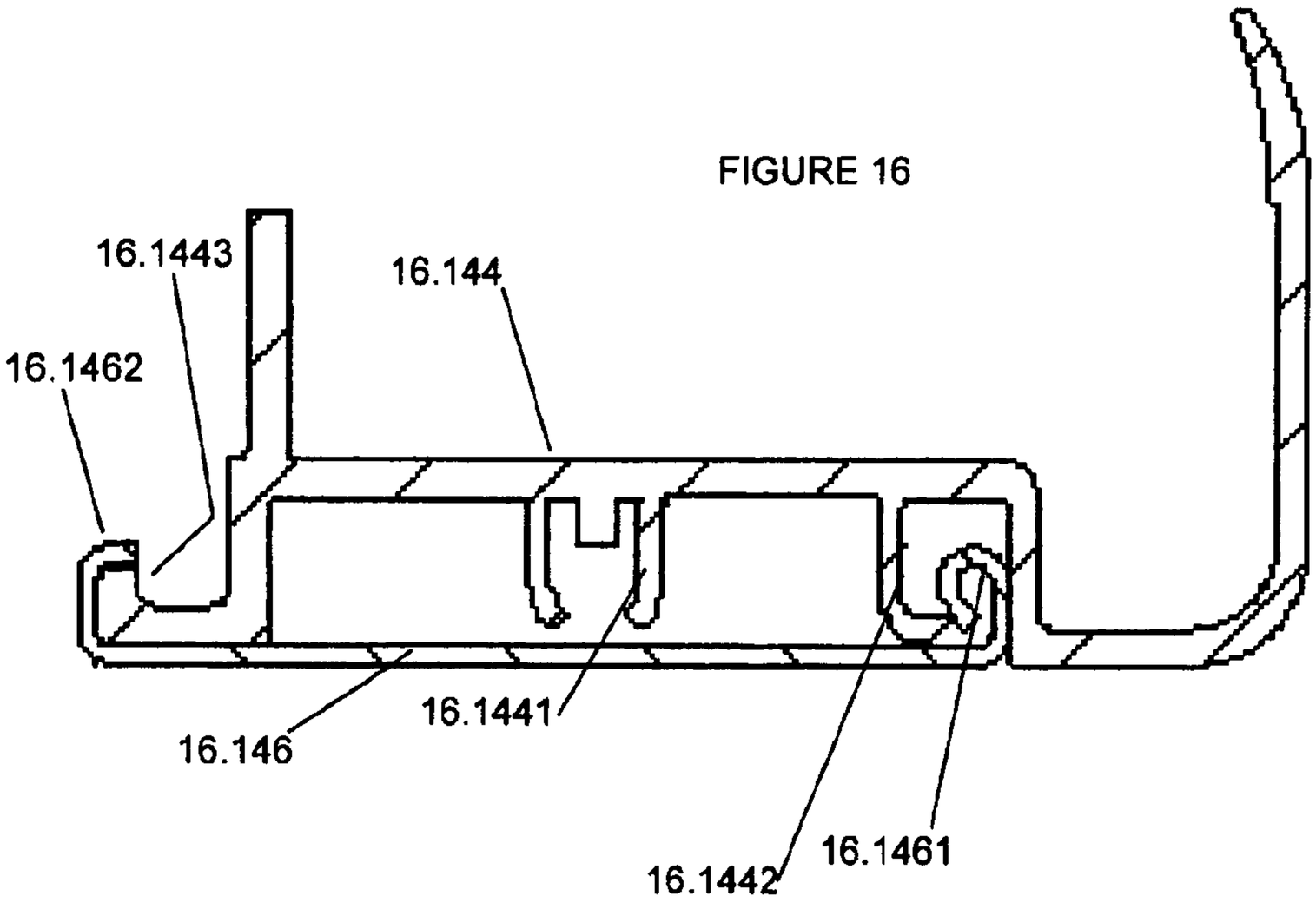
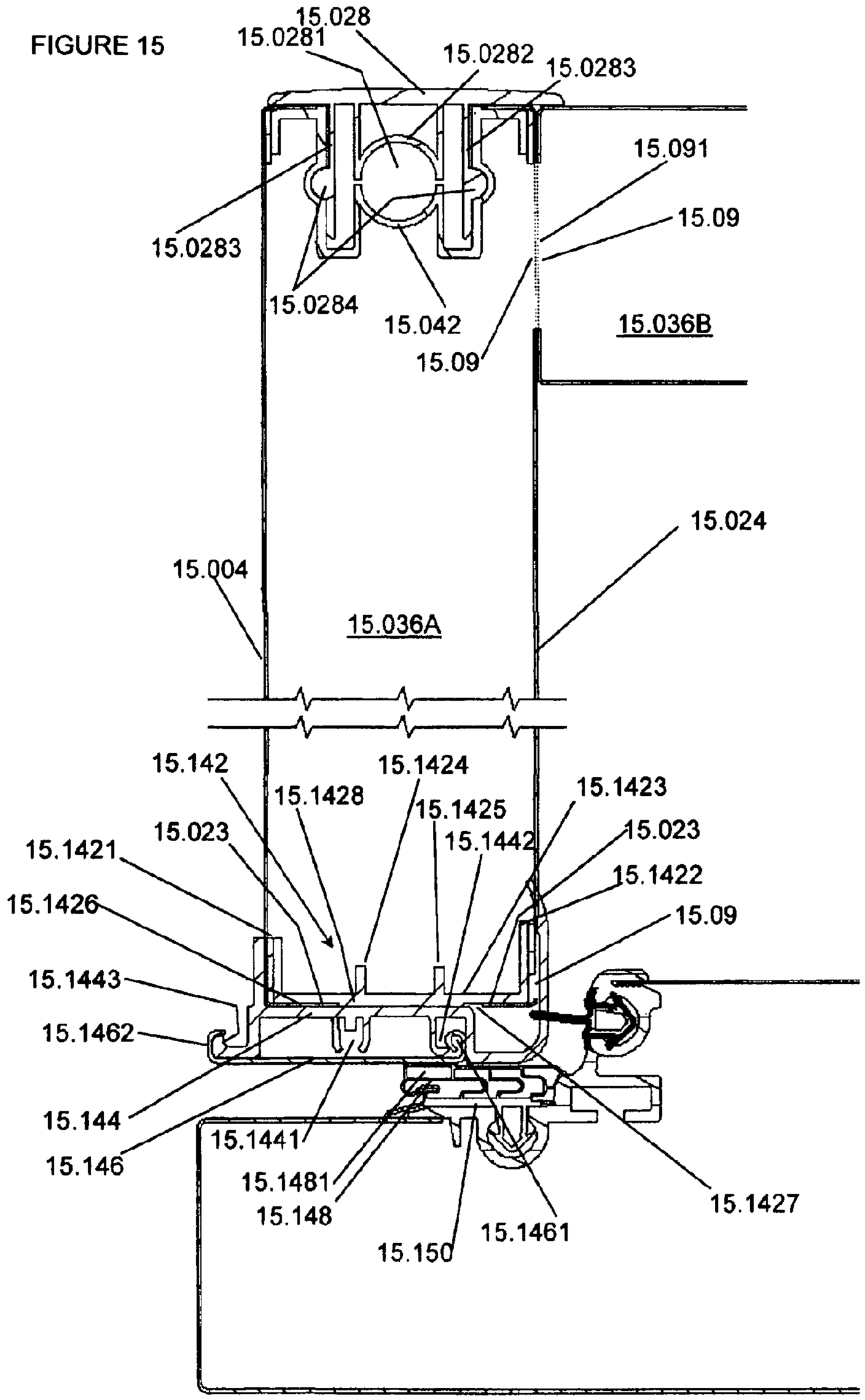


FIGURE 15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INSULATED PANEL AND METHOD OF ASSEMBLY

FIELD OF THE INVENTION

This invention relates to insulated panels and a method of assembling insulated panels.

The invention is particularly suited for insulated panels for cold apparatus such as, for example, refrigerators, freezers, refrigerator and freezer combinations, wine coolers, wine cabinets, side by side, multi door and undercounter refrigerators etc.

BACKGROUND OF THE INVENTION

The manufacture of cold appliance is commonly done close to the customers because of the bulky nature of the appliances, a large proportion of the volume being empty space. This increases the cost of transportation. The cabinet must be easily assembled to form a rigid structure with good thermal insulation characteristics, and to resist moisture migration, and must have an aesthetically attractive appearance. A further complication is that the cabinet must contain technical equipment for performing different functions. In particular, the cold appliance must have a refrigeration system and associated sensors and controls.

Another problem associated with the manufacturing of cold appliances is that it involves high investment costs for the development of product lines and the like. Conventional manufacturing plants for cold appliances are usually inflexible, so that it is difficult to adapt the plant for manufacturing cold appliances with differing dimensions and variable component options in small series. Normally, new product designs require large production runs to be economically feasible. Thus the developers are discouraged from innovation, or variations in product design are very costly.

It is desirable to provide a cold appliance which can be manufactured in segments amenable to transport and which can be assembled to from the cabinet at another location which does not need the complex and expansive manufacturing equipment of the primary manufacturing site. The segments should be easy to assemble and interconnect.

The current method for making insulation panels uses continuous line assembly. However, this can be problematic where foamed-in brackets and reinforcements are required, as improper location of these elements can result in a high scrap rate. Further, it is difficult to incorporate vacuum insulation panels in a continuous line process. Plastic trim over open foam edges needs adhesive to attach the trim. It is also difficult to incorporate roll forming of steel panels into a continuous line process.

This invention seeks to ameliorate, at least in part, one or more of these problems.

SUMMARY OF THE INVENTION

The present invention provides an insulated panel including first and second panel members spaced apart by a predetermined distance, each panel member including a periphery having a peripheral flange or edge, the panel including an intermediate joining member adapted to connect to the peripheral flanges or edges of the first and second panel members.

The joining member can include an elongate profiled member extending at least part way along each side of the flanges of the first and second walls.

The joining member can include at least one channel which will be inwardly directed so as to receive expandable foam.

The joining member can also include at least one slot to engage at least one flange.

The joining member can be attached to at least one of the flanges by adhesive.

The adhesive can be in the form of a double sided foamed tape.

A vacuum panel can be attached to the interior surface of at least one of the walls.

The panel can include foamed-in brackets or reinforcing elements.

The joining member can include a cavity accessible from the outside of the panel.

The cavity can provide a conduit to receive elongated elements, said conduit running partially or totally along length of said panel.

The joining member can have the cavity closed by means of a cap member.

The peripheral flange or edge can be formed by a first bend, or a first and second bend.

The cavity can serve as a conduit to conduct cables and or tubes from one location on said panel to another.

The present invention also provides a method of forming an insulating panel as described above, including the step of roll-forming a bend and or extruding the join member.

The method can include the steps of engaging a joining member to a first panel wall, and attaching the joining member to the second panel wall.

The method can also include the step of filling the space between the panel walls with insulating foam.

The present invention further provides an elongate joining member adapted to join the edges of a pair of panel walls, the joining member including at least one slot or rebate adapted to engage an edge of at least one of the panel wall edges.

The joining member can be a profiled extrusion.

The joining member can include at least one slot adapted to engage an edge of at least one panel wall.

The joining member can include an attachment surface adapted to be attached to an edge of a wall panel by adhesive.

The joining member can include a trim attachment formation.

The trim attachment formation can be in the form of a snap fit section recess.

The joining member can include at least one inboard directed channel portion.

The joining member can include at least one outboard directed channel portion.

The outboard directed channel can be capped to form a covered conduit.

The present invention also provides an elongate joining member adapted to join the edges of a pair of panel walls, the joining member including at each end a corner formation to be received into a respective internal corner of said pair of panel walls, and having at least one slot or channel adapted to receive a sealing means or insulation foam.

The joining member can be a profiled extrusion.

The joining member can include at least two slots, each adapted to receive a sealing means.

The corner formation can include an attachment or rebate surface adapted to be attached to a panel wall by adhesive.

The joining member can include inboard directed projections or channels to allow greater contact for the foaming in of said joining member.

The sealing means can be in the form of a gasket or tape.

The sealing means can be adhered to said slot and projects proud of the outboard periphery of said slot.

The joining member can include a slot or channel which can act as a conduit to conduct cables and or tubes from one location to another.

The present invention further provides an insulated panel including first and second panels spaced apart by a predetermined distance, each panel including an angled periphery formed by a bend, the bend forming an internal corner, the panel including an intermediate joining member adapted to connect to the internal corners of the first and second walls.

The joining member can include an elongate profiled member extending at least part way along each side of the periphery of the first and second walls.

The joining member can include at least one slot or at least one inboard extending projection.

The joining member can be attached to one of the first and second walls by adhesive.

The adhesive can be in the form of a double sided foamed tape.

One or more vacuum panels can be attached to the interior surface of at least one of the walls.

The panel can include foamed-in brackets or reinforcing elements.

The present invention further provides a method of forming an insulating panel as described above, including the step of roll-forming one or two bends at or near to the periphery of the first and second walls.

The method can include the step of engaging a joining member to a first panel wall, and attaching the joining member to the second panel wall.

The method can include the step of filling the space between the panel or walls with insulating foam.

The present invention also, provides a cabinet or, appliance assembled from a panel as described above, or manufactured by the method described above, or which utilises a joining member as described above.

The present invention further provides a joining member, an insulation panel, a cabinet or appliance assembled with these, and a method of manufacturing an insulation panel, being substantially as herein described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment or embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. **1** is an illustration of a first panel adapted for use in an embodiment of the invention

FIG. **2** is an illustration of a second panel adapted for use with the panel of FIG. **1**.

FIG. **3** is a partial section illustration of an assembly of a pair of panels.

FIG. **4** is an illustration of a top edge cap.

FIG. **5** shows detail of an edge of a panel assembly of FIG. **3**.

FIG. **6** illustrates a section of an alternative joining extrusion.

FIG. **7** illustrates a section of an alternative joining extrusion.

FIG. **8** shows a partially exploded view of a panel assembly including foamed-in brackets.

FIG. **9** shows a partial cross section of an alternative panel assembly, and panel join.

FIG. **10** shows a cross section through three panels joined to form a cabinet.

FIG. **11** illustrates a perspective view of a metal panel to be used in the panel assembly of FIG. **9**.

FIG. **12** illustrates an exploded perspective view of the upper left hand corner of the panel of FIG. **11**.

FIG. **13** illustrates an exploded perspective view of the upper right hand corner of the panel of FIG. **11**.

FIG. **14** illustrates a perspective view of a corner of an assembled panel made by the method of FIGS. **9** to **13**.

FIG. **15** illustrates a cross-section view of an alternative panel assembly mechanism and panel joining method and interaction with a door panel.

FIG. **16** illustrates a detailed cross sectional view of the end section and trim member to complete the front edge of eth panel of FIG. **15**.

The numbering convention used in the drawings is that the digits in front of the full stop indicate the drawing number, and the digits after the full stop are the element reference numbers. Where possible, the same element reference number is used in different drawings to indicate corresponding elements.

It is understood that the drawings are intended to be illustrative rather than exact reproductions, and are not necessarily drawn to scale. The orientation of the drawings is chosen to illustrate the features of the objects shown, and does not necessarily represent the orientation of the objects in use.

DETAILED DESCRIPTION OF THE EMBODIMENT OR EMBODIMENTS

FIG. **1** illustrates an internal wall arrangement **1.002** including a major wall panel **1.004**, the edges of which have been folded to form a shallow open box with a peripheral channel with attachment flanges **1.006**, **1.008**, **1.010**, **1.012**. The corners of the flanges can be mitred as shown, for example, at **1.014**.

A second wall arrangement **2.022** is illustrated in FIG. **2** for assembly with the panel wall **1.002** of FIG. **1**. The wall arrangement **2.022** can be a mirror image of the rear wall arrangement **1.002** of FIG. **1**. Because the walls are symmetric, the wall arrangements **1.002**, **2.022** can be identical, to reduce inventory. The panels are assembled with the peripheral channels facing each other. As discussed below, a joining member is used to connect the channel of the two panels. The walls can be roll formed and transported as a flat-pack.

FIG. **3** illustrates a section of a panel assembly including a panel **3.030** formed by the front wall **3.024** and rear wall **3.004** such as those of FIGS. **2** and **1** with additional panel assembly elements. The front panel **3.024** has a vacuum panel **3.032** attached to its inner surface, for example, by adhesive, or by other suitable means such as welding etc. A trim cap **3.038** is attached to the top edge of the panel assembly. Joining members connect the flanges of the channels as is described in more detail below.

FIG. **4** is a section view of a top cap member **4.038** which is adapted to connect with the snap fit slot of the joining member vis a number of snap fit spigots **4.040**. This can extend along the length of the panel. As would be understood by a person skilled in the art, the snap fit elements can be interchanged in an alternative embodiment. The cap can include a pair of legs adapted to extend down the exterior face of the walls **3.004**, **3.024**.

The rear wall panel **3.004** and the front panel wall **3.024** are connected by a joining member **5.024** better illustrated in the partial view of **3.034** shown enlarged in FIG. **5**. The front wall includes an internal peripheral channel formed by the inward bent segment **5.023** and the transverse bent segment or flange **5.025**. The rear wall assembly includes a similar mirror image peripheral channel.

The joining member **5.024** can be an elongate member, and can be formed by extrusion. It includes a first slot such as **6.046** in FIG. **6** into which the upturned channel wall **5.025** is engaged, preferably in an interference fit. The open end of the slot **6.046** can be tapered to facilitate engagement of the channel wall **5.025** with the slot. The other side of the joining member is a substantially flat surface which is attached to the inner wall of the flange of the rear wall channel by adhesive. In this embodiment, double sided foam tape **5.044** is used.

The foam tape **5.044** can assist insertion of a snap fit spigot of a trim attachment when the spigot is inserted into the snap fit section slot **6.050** as the foam tape will permit deflection of the side of the snap fit slot. The foam tape **5.044** also allows compression or expansion when the assembly is foam filled, with, for example, polyurethane foam.

A second panel **5.036** is shown as a butt attachment to the panel **5.030**. The panel **5.036** can be attached to the panel wall **5.004** by adhesive applied to the abutting surfaces of the two panels.

An overcrowned mushroom headed trim piece **5.028** is attached to the edge of the panel assembly by the snap-fit spigots such as **5.040**.

The panel also **5.036** includes a gap similar to the gap between the wall panels **5.004**, **5.024** extending along its butting edge in which foam tape **5.054** is inserted. The foam tape **5.054** can absorb tolerances in the assembly and foaming processes and provide a thermal break.

The extrusion can be attached along all four sides of the channel. The corners of the extrusions can be mitred for neat appearance and effective sealing.

The space between the front and back walls can be filled with insulating foam.

The panel walls can be stainless steel, a plastics material or other suitable material.

FIG. **6** illustrates an alternative joining member having a second slot **6.048** for attachment to the channel wall **5.056** of the rear panel. However, with a complete peripheral channel arrangement with mitred corners, such an arrangement cannot be readily utilized because the joining member must be connected to the internal flanges.

FIG. **7** illustrates a modified version of the joining member of FIG. **6** which includes a chamfered surface to facilitate engagement with the rear channel wall. The joining member is attached to the flanges of a first panel wall channel using the slots **7.046**. The inclined surface **7.052** serves to deflect the flanges of the peripheral channels so they can snap into the slots **7.048** of the second panel wall when the assembled first panel wall and joining members are pressed against the flanges of the second panel wall. To allow for the additional rigidity of the flanges at the mitred corners, the inner slot **7.048** and inclined surface **7.052** can be terminated short of the corners.

FIG. **8** shows a partially exploded view of a panel assembly including foamed-in brackets **8.060**, **8.062**. The bracket **8.060** can be for example, a hinge support bracket to which a hinge can be attached. The bracket **8.062** can be a support bracket by which the refrigeration apparatus can be attached to a wall or adjacent cabinets, etc. The brackets can be installed in the panel wall **8.024** by adhesive, double sided tape, masking tape or other suitable means before the second wall **8.004** is attached to the foam tape **8.044**. The second wall panel **8.004** has a cut-out **8.020** adapted to accommodate the bracket **8.060** when the walls are assembled. The adhesive foam tape **8.044** and the joining member **8.042** can also have cut-outs adapted to accommodate the bracket **8.060**. The bracket **8.062** does not require any cut-outs as it is seated on the wall **8.024** and is within the channel flange **8.056**. The other flange **8.025** is not visible because of joining member **8.042**.

When the foam insulation is injected, it will hold the brackets in place and also serve as an adhesive to keep the panels and other elements of the panel assembly in place.

Illustrated in FIGS. **9** to **13** is an alternative joining member **9.042**, which is an extruded plastic or polymeric member, having three inboard channel or slot portions **9.0421**, **9.0422** and **9.0423**, and two outboard channel or slot portions **9.0424** and **9.0245**. The outboard faces of the two sides of the channels **9.0421** and **9.0423** form an external ninety degree corner, which can be mated to an internal corner of the walls **9.004** and **9.024**, with one or both of the outboard faces being used to adhere the joining member **9.042** to the walls **0.004** and **9.024**. In the illustration of FIG. **9**, only the outboard face of the left side wall of channel **9.0421**, and the outboard face of the right side wall of channel **9.0423** are used to mount double sided tape **9.044** to adhere the walls **9.004** and **9.024** into an assembly.

The external channels **9.0424** and **9.0425** each can receive a gasket or foam tape **9.054** such as an EPDM foam tape which is adhered into the channels or slots, and projects proud of the outboard extremity or periphery of the member **9.042**, in an outboard direction. As seen at the right hand side of FIG. **9**, where the a second assembled panel **9.036**B is joined to the wall **9.024** of assembled panel **9.036**A, the tape **9.054** compresses and changes shape, to provide a seal. When this join is made the external surfaces of the bent segments **9.023** of the panel **9.036**B are adhered by means of a polyurethane based adhesive.

The joining member **9.042** is preferably used all around the edges of an assembled panel, with mitred joins between abutting joining members **9.042**, so as to produce a mitred external corner as represented in FIG. **14**.

The panel **9.036**A and **9.036**B are different to each other in that the panel **9.036**A has a thermal break **9.09** in the wall **9.024**, which as better seen in FIGS. **11**, **12** and **13**, is a longitudinal slot cut through the wall **9.024**. This slot assist in ensuring heat is not transferred into or out of the assembled panels because conduction through the metal, of the wall **9.024**. Before the interior of the panel **9.036**A is filled with foam, the thermal break **9.09** is sealed by tape to prevent foam escaping, and this, will result, once foamed-in in a foam exterior surface represented by broken line **9.091**, against which the tape **9.054** in the panel **9.036**B can also make contact with.

With respect to assisting with the foaming-in of the joining member **9.042** into the assembled panel **9.036**A or **9.036**B, the member **9.042** includes inwardly directed projections **9.0426** and **9.0427** respectively extending from the inboard sides of the bases of channel **9.0424** and **9.0425**. These projections provide greater surface area of contact for the expanding foam to adhere to as it sets.

Illustrated in FIG. **10**, is a representation of the joining of three panels **10.036**A, **10.036**B and **10.036**C, joined together by means of the joining system described with respect to FIG. **9**. FIG. **10** is a plan view section of the three walls of a cabinet. It will be noted that the rear of the cabinet has foam tape **10.054** present and exposed, however if desired the tape **10.054** can be removed or the panels **10.036**A and **10.036**C assembled so that the external faces of the joining members do not include such foam tape.

Illustrated in, FIGS. **11** to **13** is the wall panel **11.024**, **12.024** and **13.024**. The whole wall panel **11.024** is shown in FIG. **11**, and it can be seen that on the left hand side of the panel **11.024** is the left hand side thermal break **11.09** which is slot or rectangular elongated opening down the whole

length of the wall **11.024**. The upper corner of panel is seen in FIG. **12**, which further illustrates that the upper edge bent segment **12.023** extends past the corner **12.0233** in a downward direction to meet up with the side edge bent segment **12.023**. A join line **12.0231** is provided which is first angled at **12.0234** to the vertical and then terminates at the rear edge with a horizontal segment **12.0235**. By providing a join line which is first inclined to the vertical and then horizontal, this provides a relatively safe edge to work with, and by virtue of the foam on the inside surface of the bent segments **12.023** to adhere the joining member **9.042** thereto, a strong corner join is produced which provides a better finish.

Illustrated in FIG. **15** is an alternative panel assembly mechanism and panel joining method which is also illustrated having the front edge interacting with a door panel. This assembly mechanism is similar to that of previous figures and like parts have been like numbered.

In FIG. **15** the side panel **15.036**A is joined to a rear panel **15.036**, which will be described in more detail later. While front edge of the panel **15.036**A has a join member **15.142**, which can be described as having channel construction with side walls **15.1421** and **15.1422** extending generally perpendicularly from the central portion **15.1423**. The side wall **15.1422** is longer in extension than the wall **15.1421** so that it can extend across the thermal break gap **15.09** in the region where they overlap. The join member **15.142** also includes shorter intermediate walls **15.1424** and **15.1425**, which assist the join member **15.142** in being foamed into the panel and to keep the join member secured to the panel when the foam has set.

It will be noted that the outboard face of the join member **15.142** includes rebated edge surfaces **15.1426** and **15.1427**, which allows the bent segments **15.023** to sit therein. By this means the outer surfaces of segments **15.023** and the relatively protruding surface **15.1428** form a generally straight or planar end onto which can be attached a finishing member or break piece **15.144**. The break piece **15.144** is attached to the extrusion or join member **15.142** by gluing or any appropriate joining means. A trim piece **15.146** is attached to the break piece **15.144**. The trim piece **15.146** can be of a magnetisable material for producing sealing force with the seal **15.148** which has a magnet **15.1481** which is mounted a door extrusion **15.150**.

The break piece **15.144** includes a series of clips or an extruded or elongated clip structure such as **15.1441** adapted to receive a heat transfer fluid ducting, conduit or tubing, which is not illustrated. The clips hold the heat transfer fluid ducting, conduit or tubing in proximity to the trim member **15.146** so heat from the ducting, conduit or tubing can heat the trim member **15.146** in the region where condensation may otherwise form.

From FIGS. **15** and **16**, it can be seen that the trim member **15.146** has a curled formation on its inboard edge **15.1461**, and on its outboard edge **15.1462** it has a two bends to from a generally J-shaped edge. The break piece **15.144** includes an inboard hook **15.1442** and an outboard hook **15.1443**, so that the trim **15.146** can be first engaged with hook **15.1443** by edge **15.1462** and then the trim rotated so that the edge **15.1461** can push past the hook **15.1442** and then be caught and held in place by the hook **15.1442**.

At the rear end of side panel **15.036**A, the rear edge of the panel **15.036**A is formed from a join member **15.042**, which is shaped to receive a complementarily shaped capping member **15.028**. The members **15.042** and **15.028** together create a duct or conduit **15.0281**, into which heat transfer fluid tubes, water tubes, electrical and signal cables or wires or harnesses can be located and run. If desired the formation **15.0282** which forms the other half of cylindrically shaped conduit **15.0281** can be absent, thus providing an even bigger conduit cavity, if required.

The cap **15.028** includes two inwardly directed projections **15.0283** having locking members **15.0284** to engage complementarily shaped recesses on the join member **15.042**.

It will be noted from FIG. **15** that the cap **15.028** overlaps the external join line between the panels **15.036**A and **15.036**B, to thereby hide the join line. The join between the panels **15.036**A and **15.036**B is similar to that illustrated in FIG. **9**, except that the panel **15.036**B does not include a join member between the inboard and outboard panels, but still includes a thermal break **15.09**, as does the panel **15.036**A which includes a side located thermal break **15.09**. The two panels can be joined together by gluing or otherwise adhering the metal surfaces which make contact with each other.

The join member **15.042** includes rebated edges, in a similar manner to the join member **15.142**, so as to receive the bent edges of the panels **15.004** and **15.024**.

The join member **15.042** is preferably used on the rear edge and upper edges of the side panels **15.036**A, while it is preferred that the join member **15.142** is used on the lower and front edges of the side panels **15.036**. However, which join member is to some extent dependent on the need to utilise the conduit **15.0281**.

It will be readily understood that the extrusion from which cap member **15.028** is manufactured will be usable on both the left and right rear side panels to cover the join line between the panels **15.036**A and **15.036**B, as it simply requires an orientation adjustment. This observation applies to the trim member **15.146**, the break piece **15.144** and join member **15.142**, which each have an element of right or left handedness, but this is readily resolved by rotation before use for the other side.

In this specification, reference to a document, disclosure, or other publication or use is not an admission that the document, disclosure, publication or use forms part of the common general knowledge of the skilled worker in the field of this invention at the priority date of this specification, unless otherwise stated.

In this specification, terms indicating orientation or direction, such as “up”, “down”, “vertical”, “horizontal”, “left”, “right” “upright”, “transverse” etc. are not intended to be absolute terms unless the context requires or indicates otherwise. These terms will normally refer to orientations shown in the drawings.

Where ever it is used, the word “comprising” is to be understood in its “open” sense, that is, in the sense of “including”, and thus not limited to its “closed” sense, that is the sense of “consisting only of”. A corresponding meaning is to be attributed to the corresponding words “comprise”, “comprised” and “comprises” where they appear.

It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text. All of these different combinations constitute various alternative aspects of the invention.

While particular embodiments of this invention have been described, it will be evident to those skilled in the art that the present invention may be embodied in other specific forms without departing from the essential characteristics thereof. The present embodiments and examples are therefore to be considered in all respects as illustrative and not restrictive, and all modifications which would be obvious to those skilled in the art are therefore intended to be embraced therein.

The invention claimed is:

1. A panel assembly comprising:

a first panel;

a second panel adjacent and parallel to the first panel to form a volume between the first panel and the second panel;

the first panel having a first panel edge that is turned towards the second panel to form a first internal corner;

the second panel having a second panel edge that is turned towards the first panel to form a second internal corner, the second panel edge being spaced from the first panel edge to form a gap therebetween;

an elongate joining member joining the first panel and the second panel and having an inboard side facing the volume between the first panel and the second panel and an outboard side facing away from the volume between the first panel and the second panel, the elongate joining member having:

a first corner formation received in the first internal corner and comprising a first side adjacent the first panel and a first end adjacent the first panel edge,

a second corner formation received in the second internal corner and comprising a second side adjacent the second panel and a second end adjacent the second panel edge, wherein the second side is parallel to the first side, and

at least one outboard channel formed on the outboard side of the elongate joining member and located between the first corner formation and the second corner formation, the at least one outboard channel being located in the gap between the first panel and the second panel and facing away from the volume between the first panel and the second panel,

a sealing means or insulation foam located in the at least one outboard channel; and

wherein the panel assembly is configured for use in a cold apparatus.

2. The panel assembly as recited in claim **1**, wherein the elongate joining member is a profiled extrusion.

3. The panel assembly as recited in claim **1**, further comprising at least two outboard channels, each outboard channel adapted to receive a respective sealing means or insulation foam.

4. The panel assembly as recited in claim **1**, wherein the elongate joining member includes one or more inboard directed projections extending from an inboard side of the elongate joining member into the volume between the first panel and the second panel or channels to increase a surface area of the inboard side of the elongate joining member.

5. The panel assembly as recited in claim **1**, wherein the sealing means comprises is in the form of a gasket or a tape.

6. The panel assembly as recited in claim **5**, wherein the sealing means projects, in at least an uncompressed state, in an outboard direction from an outboard periphery of the outboard channel.

7. The panel assembly as recited in claim **1**, further comprising insulating foam located between the first panel and the second panel.

8. The panel assembly of claim **1**, wherein the first side, first end, second side and second end are formed on the outboard side of the elongate joining member.

9. The panel assembly of claim **1**, wherein the elongate joining member includes one or more inboard channels formed on the inboard side of the elongate joining member and facing the volume between the first panel and the second panel to increase a surface area of the inboard side of the elongate joining member.

10. The panel assembly of claim **1**, further comprising a third panel perpendicular to the first panel and the second panel and adjacent the first panel edge, the second panel edge, and the outboard side of the elongate joining member, wherein the sealing means or insulation foam contacts the third panel.

11. The panel assembly of claim **10**, wherein the sealing means or insulation foam is compressed between the outboard side of the elongate joining member and the third panel.

12. The panel assembly of claim **1**, further comprising an adhesive tape joining at least one of: the first panel to the first side of the first corner formation, or the second panel to the second side of the second corner formation.

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